

What is claimed is:

① A spark plug comprising:

a center electrode having a tip;

5 a ground electrode having a center electrode-opposed surface facing the tip of said center electrode;

a noble metal member having a given length and a first and a second end opposed to each other through the length, said noble metal member being joined at the first end to the center
10 electrode-opposed surface of said ground electrode by laser welding so as to oppose the second end to the tip of said center electrode through a spark gap; and

a fused portion that forms a weld of said noble metal member and said ground electrode formed by materials of said ground
15 electrode and said noble metal member melted together,

wherein a sectional area of said noble metal member traversing the length thereof is greater than or equal to 0.1mm^2 and smaller than or equal to 0.6mm^2 ,

wherein an unfused sectional area percentage that is a
20 percentage of a sectional area of an unfused portion of the first end of said noble metal member within a range of a sectional area of said noble metal member closest to said fused portion traversing the length of said noble metal member is less than or equal to 50%, and

wherein a melt angle that is an angle which a line extending
25 through said fused portion along a maximum depth of said fused portion makes with the center electrode-opposed surface of said

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ground electrode is less than or equal to 60° .

2. A spark plug as set forth in claim 1, wherein if a point at which the line extending along the maximum depth of said fused
 5 portion intersects an outer surface of said fused portion is defined as an intersection F , and a distance between the intersection F and the center electrode-opposed surface of said ground electrode is defined as an intersection-to-surface distance y , the intersection F is located
 10 within a range of -0.2mm to 0.3mm where when the intersection F is located outside the center electrode-opposed surface of said ground electrode, the intersection-to-surface distance y is expressed in a plus value (+), and when the intersection F is located inside the
 15 center electrode-opposed surface of said ground electrode, the intersection-to-surface distance y is expressed in a minus value ($-$), and wherein said melt angle is less than or equal to $(30 + 100y)^{\circ}$.

3. A spark plug as set forth in claim 1, wherein if a width of a portion of said noble metal member closest to said fused portion is defined as D , the maximum depth of said fused portion is less than
 20 or equal to $1.4D$.

4. A spark plug as set forth in claim 1, wherein said noble metal member is made from one of a first material containing a main component of 50Wt% or more of Pt and an additive of at least one of
 25 Rh, Ir, Os, Ni, W, Pd, and Ru and a second material containing a main component of 50Wt% or more of Ir and an additive of at least

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one of Rh, Pt, Os, Ni, W, Pd, and Ru.

⑤ A spark plug comprising:

a metal shell;

5 a center electrode retained in said metal shell to be insulated from said metal shell, said center electrode having a tip exposed outside said metal shell;

a ground electrode installed on said metal shell, said ground electrode having a tip which has a center electrode-opposed side surface facing the tip of said center electrode and an end surface; and

a noble metal member that is at least partially embedded in the end surface of said ground electrode and joined to said ground electrode by laser welding through a fused portion that forms a weld of said noble metal member and said ground electrode formed by materials of said ground electrode and said noble metal member melted together, said noble metal member having a tip projecting from the center electrode-opposed side surface of said ground electrode toward said center electrode so as to define a spark gap between the tip of said noble metal member and the tip of said center electrode.

6. A spark plug as set forth in claim 5, wherein if a width of a portion of said noble metal member closest to said fused portion in a direction perpendicular to the end surface of said ground electrode is defined as $D1$, a depth of a portion of said noble metal member

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embedded in the end surface of said ground electrode is greater than or equal to $0.5D1$.

7. A spark plug as set forth in claim 5, wherein said noble metal
5 chip has a length, and a sectional area of said noble metal member traversing the length thereof is greater than or equal to 0.1mm^2 and smaller than or equal to 0.6mm^2 .

8. A spark plug as set forth in claim 5, wherein if a width of a
10 portion of said noble metal member closest to said fused portion in a direction perpendicular to the end surface of said ground electrode is defined as $D1$, a width of said portion of said noble metal member in a direction parallel to the end surface of said ground electrode is defined as $D2$, a width of said fused portion is defined as N , and a
15 maximum depth of said fused portion is defined as H , the maximum depth H is smaller than or equal to $2D1$, and the width N is smaller than or equal to $2.5D2$.

9. A spark plug as set forth in claim 8, wherein a depth of a
20 portion of said noble metal member embedded in the end surface of said ground electrode is greater than or equal to $0.5D1$.

10. A spark plug as set forth in claim 5, wherein said noble metal
member is made from one of a first material containing a main
25 component of 50Wt% or more of Pt and an additive of at least one of Rh, Ir, Os, Ni, W, Pd, and Ru and a second material containing a

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main component of 50Wt% or more of Ir and an additive of at least one of Rh, Pt, Os, Ni, W, Pd, and Ru.

11. A method of fabricating a spark plug comprising the step of:
5 preparing a center electrode;
placing a ground electrode so as to have a center
electrode-opposed surface facing said center electrode through a
spark gap;

10 preparing a noble metal member having a length and a first
and a second end opposed to each other through the length; and
joining said noble metal member at the first end to the center
electrode-opposed surface of said ground electrode by radiating a
laser beam toward a corner defined by a side wall of said noble metal
member continuing from the first end and the center
15 electrode-opposed surface of said ground electrode from a direction
diagonal to the center electrode-opposed surface to fuse a portion of
said noble metal member and a portion said ground electrode,
thereby forming a weld between said noble metal member and said
ground electrode.

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12. A method of fabricating a spark plug comprising the step of:
preparing an assembly of a center electrode and a ground
electrode, the center electrode being installed within a metal shell in
an electric insulating fashion with a tip projecting from the metal
25 shell, the ground electrode being installed on the metal shell with a
tip having a center electrode-opposed side surface facing the tip of

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said center electrode and an end surface;

forming a groove in the end surface of the ground electrode;

and

embedding a noble metal member at least partially embedded

- 5 in the groove in the end surface of the ground electrode with a tip
projecting from the center electrode-opposed side surface of the
ground electrode toward the tip of the center electrode and joining
the noble metal member to the ground electrode by laser welding to
form a fused portion that is a weld of the noble metal member and
10 the ground electrode made up of materials of the ground electrode
and the noble metal member melted together.

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